Bonn. zool. Beitr.
35 (1984), Heft 1–3

On the presence of shrews (Soricidae) in the Canary Islands

by

A. MARTÍN, R. HUTTERER and G.B. CORBET

The terrestrial vertebrates of the Canary Islands have attracted the attention of numerous zoologists during the last two centuries, but most of these authors concentrated on the study of birds and reptiles. It was only in recent years that a few authors began to study the mammals of these islands (Herter 1972, 1974; Niethammer 1972; Schwabe 1979; Hutterer 1979, 1983). Curiously enough, most of these studies dealt with the taxonomy and distribution of the Algerian hedgehog (*Erinaceus algirus*). The low interest in the Canarian mammals is not surprising as most species are thought to have been brought into the islands by chance or human activity. This is correct for *Mus* sp., *Rattus rattus*, *R. norvegicus*, *Oryctolagus cuniculus*, *Erinaceus algirus* and *Atlantoxerus getulus*. Apart from these, six species of bats have been mentioned in the literature. On Tenerife there have been found remains of a fossil giant rat, *Canariomys bravoi*, which lived during the Plio/Pleistocene as a member of the endemic vertebrate fauna of the Canary Islands. Except for the hedgehog, all mammals are very little known. In this note we present records of two species of Soricidae, a family hitherto unknown from the Canary Islands.

At the end of March 1983 one of us (A. Martín) had the opportunity to visit the arid islets north of Lanzarote. These islands, namely Graciosa, Montaña Clara, Alegranza and the small Roque del Este and Roque del Oeste (or Roque del Infierno) are uninhabited with the exception of Graciosa where a small population of fishermen lives, counting about seven hundred persons. The remaining islets are visited occasionally during summer by fishermen who collect the nestlings of the shearwater (*Calonectris diomedea*), a bird which is very abundant on these rocks. Table 1 presents some topographical characters of the small eastern islands. The marine depth separating this group of islands from Lanzarote, Fuerteventura and Lobos (NE of Fuerteventura) is less than 200 m, so one may consider them as one unit which might have been connected during the last glaciation.

The vegetation of the islets is poor but the plants are perfectly adapted to the climatic conditions. They are characterised by almost no precipitation, high insolation and constant winds containing seawater. In fact the vegetation is very similar to that of Lanzarote and Fuerteventura and resembles also that of the NW coast of Africa. Some major representatives are *Launaea arborescens*, *Euphorbia balsamifera*, *Salsola vermiculata*, *Lycium intricatum*, *Zygophyllum*

Table 1

	Surface area (km^2)	Maximum extension (km)	Maximum elevation (m)
Graciosa	27	9	266
Alegranza	12	3.5	289
Montaña Clara	1	2	256
Roque del Este	0.07	0.57	84
Roque del Oeste	0.06	0.22	41

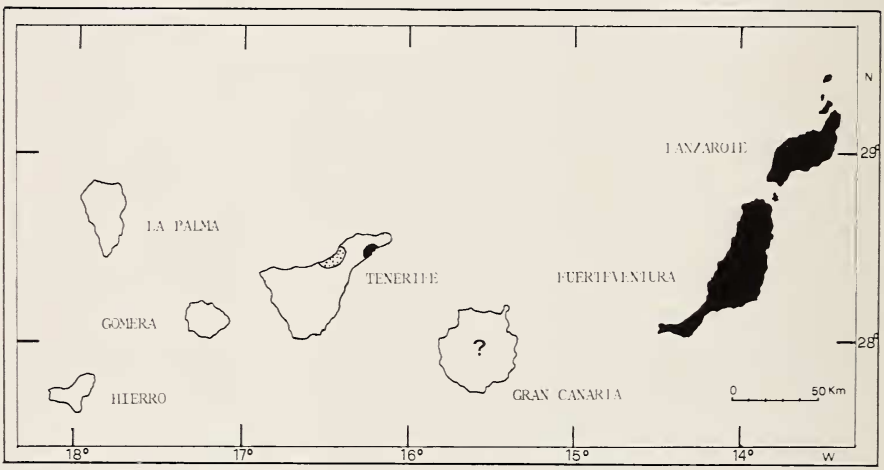

Fig. 1. Distribution of Soricidae in the Canary Islands. In black, *Crocidura russula yebalensis*, stippled, *Suncus etruscus*. A question mark indicates the presumed existence of shrews on Gran Canaria.

fontanesii, *Suaeda* and *Atriplex*. For details of the vegetation see Kunkel (1971).

On one of the four volcanic hills of Graciosa (Montaña Amarilla) several bones were found under a resting site of *Tyto alba*, among which was a skull of a shrew belonging to the genus *Crocidura*. Further analysis of the remains revealed 22 skulls of *Mus* sp., 20 of the lizard *Tarentola angustimentalis*, and several elytra of insects. One of the identified insects (*Pimelia lutaria*) is a beetle endemic to Fuerteventura, Lanzarote and Graciosa. No other indications for the presence of shrews on Graciosa were found. To confirm the presence of shrews in the Canary Islands the following islands and islets were visited:

Lanzarote (9—16 June 1983)

Three shrews were captured in the northern part of Lanzarote near the village of Teguise. Traps were set in abandoned cultivated areas along stone walls. Just

beneath there were piles of rocks. The scarce vegetation was formed by *Launaea arborescens*, *Nicotiana glauca*, *Euphorbia balsamifera* and scattered trees of *Ficus carica*. Efforts in other localities in the north (Orzola), center (Masdache) and south (Las Breñas) of the island were without success, probably because most of the traps were entered by mice. However, remains of *Crocidura* were found in pellets of *Tyto alba gracilirostris* (the endemic subspecies of the eastern islands) in the localities Tabayesco and Maguez (NW). In this area the cultivation of vines in lava funnels surrounded by stone walls is very frequent.

Graciosa (23—24 August and 2—5 September 1983)

No shrew was captured, but a few remains were found in pellets of *Tyto alba* at Pedro Barba (NE) and Montaña Bermeja (NW). We think that shrews must be very rare on this island. A batch of owl pellets (*T. alba*) found on Graciosa contained not a single shrew; of the 328 prey items there were 139 *Mus*, 148 *Tarentola*, 34 *Pimelia lutaria*, 3 birds, 2 Orthoptera, 1 *Rattus* and 1 *Lacerta*.

Montaña Clara (18—22 August 1983)

Three shrews were caught in a small barranco in the south of the island. In this place the animals lived in small holes at the foot of a rock fissure not more than 10 m above the sea level. Plants in this zone are *Launaea arborescens*, *Lycium afrum*, *Zygophyllum fontanesii*, *Suaeda* and *Salsola*. Very near to this trap site the remains of five shrews were found in the interior of a water tank. No traps were set in the gran caldera in the north of the island where adequate habitats seem to exist. It is worth noting that no rats and mice were captured on Montaña Clara. Rodents probably do not occur on this island.

Alegranza (25 August—1 September 1983)

No specimens were captured but footprints of shrews were observed at the foot of a coastal cliff in the northern part of the island. Furthermore, a few mandibles of *Crocidura* were collected in a roosting site of *T. alba* near the Montaña Lobos (SE). The number of mice found on Alegranza was very high. As mice feed also on several kinds of insects and snails, competition with *Crocidura* is most probable.

Roque del Este and Roque del Oeste

We have not trapped on these tiny islands, but considering their small size and the little existing vegetation we regard it very unlikely that shrews exist on these rocks.

Fuerteventura and Lobos

One of us collected small mammals on Fuerteventura during May 1981 but failed to get shrews (R. Hutterer). Since then López-Jurado and Ruiz (private

communication) collected some shrews and found their remains in pellets of *T. alba* on Fuerteventura and Lobos. We had also the opportunity to study four shrews collected in April 1984 by Guillermo Delgado at La Oliva in the north of Fuerteventura. This material forms part of the collections of the Museo Insular de Ciencias Naturales de Santa Cruz de Tenerife. The shrews were caught at the border of malpais (bad land) and along stone walls. The vegetation at this place consists of *Launaea arborescens*, *Lycium intricatum*, *Senecio kleinia*, *Opuntia dillenii*, *Asparagus* sp. and *Caralluma burchardii*.

Gran Canaria (11—15 May 1983)

Neither in 1981 nor 1983 did we collect a single shrew. In 1983 traps were set near Teror (in cultivated areas near a barranco where there was some running water) but caught only *Rattus rattus* and *Mus* sp. At the same time 32 pellets of *Asio otus* were collected and analysed, but without results. In the same area a student of biology of the University of La Laguna has observed and drawn an animal which doubtless represents a shrew! Furthermore there is a paper in the early literature on birds of the Canary Islands in which the author (Floericke 1903) mentioned shrews as prey of *Buteo buteo* and *Milvus milvus*. The locality mentioned by this author (Pico de Osorio) is not far from Teror. However, ornithologists assess the notes of Curt Floericke with some reservation, at least as regards his scientific papers (Gebhardt 1964). We are forced to do the same here, as he mentioned twice 'shrews and voles' (!) as food of the birds of prey, but not the very common and abundant mice and rats, which presumably have to replace his shrews and voles. Nevertheless we think that the presence of shrews on Gran Canaria is probable but needs confirmation.

Tenerife

From this island we have examined four specimens of *Suncus etruscus* collected by local people near La Victoria (350 m a.sl.) in the northern part of Tenerife (September 1983 to June 1984). In this area terraced fields are abundant on which vines and potatoes are cultivated. The fields are surrounded by stone walls. Houses exist below the trapping site. This mediterranean species is likely to be a recent introduction and is probably at present restricted to this single locality. One of us (Martín, in prep.) has analysed more than 2000 prey items of *Tyto a. alba* from the southern part of Tenerife and found not a single bone of a shrew.

However, after this paper had been completed, a man brought a shrew from Somosierra near Santa Cruz, Tenerife, in the Department of Zoology at La Laguna. This man found the shrew in the garden of his house. It turned out to be a juvenile male of *Crocidura russula* of an age of about ten days (weight 4.7 g), meaning that reproduction of the species occurs on Tenerife. This is a further and most unexpected record from this island. Our present knowledge of the distribution of shrews is summarised in figure 1.

Taxonomical notes

Suncus etruscus (Savi, 1822)

Four specimens were examined which are deposited in the Department of Zoology, University of La Laguna. One adult specimen from La Victoria measured as follows : length of head and body 41 mm, length of tail 27 mm, length of hindfoot 7 mm, length of ear 4.7 mm, condylo—incisive-length of skull 13.1 mm. These measurements are in full accordance with typical material from the Mediterranean region. This tiny shrew occurs mainly in the European part of the Mediterranean. It ist rarely found in northern Africa and known only from the northernmost part of Morocco (Vesmanis, Sans-Coma & Fons 1980). It is therefore most probable that it was imported from Europe via a Spanish port.

Crocidura russula yebalensis (Cabrera, 1913)

We have examined 77 specimens from the Canary Islands which include 11 study skins and skulls (4 Fuerteventura, 3 Lanzarote, 3 Montaña Clara, 1 Tenerife), one in alcohol, two skeletons and 63 skulls from owl pellets. Voucher specimens are deposited in the Museo Insular de Ciencias Naturales de Santa Cruz de Tenerife, Department of Zoology of the University of La Laguna, British Museum (Natural History), London, Museum Alexander Koenig, Bonn, and Naturhistorisches Museum, Wien.

External and cranial measurements are given in tables 2 and 3. Although only a few skins are available it seems that shrews from Fuerteventura have shorter tails and feet than shrews from Montaña Clara. The coloration of the pelage also differs from one island to the other. Four skins from La Oliva, Fuerteventura have a dark greyish-brown dorsal pelage and a similar dark ventral pelage, the hairs of the belly having only short whitish tips. Ears as well as hands, feet and tails are also dark brown. The overall coloration is similar to that of European *Crocidura russula* except for the venter which is darker in the Fuerteventura sample. In contrast to these the skins from Lanzarote and Montaña Clara are much paler. The tips of the dorsal hairs are light brown to sand brown, those of the ventral hairs cream-white. Along with the plumbeous hair bases this gives a speckled appearance. The tail is light coloured and the ears, hands and feet are covered with short whitish hairs. The animals from Lanzarote and Montaña Clara look very much alike and are both different from the shrews of Fuerteventura. The shrews of Lanzarote and Montaña Clara have a kind of desert coloration which is common in the shrews of neighbouring Morocco.

All skins from the Canary Islands have very long and soft fur with dorsal hairs 4.5—5.0 mm in length.

The cranial measurements (Table 3) indicate also a geographical variation in size from one island to another. Skulls from Lanzarote have shorter toothrows ($I^1—M^3$) and are narrower ($M^2—M^2$) than skulls from Fuerteventura or Mon-

Table 2. Weight (g) and external measurements (mm) of the Canary *Crocidura*. Means, ranges and sample sizes are indicated.

	Fuerteventura	Lanzarote	Montaña Clara	All Islands
Weight	7.0 (6–8); 4	7.3 (6.5–8.3); 3	8.3 (8–9); 3	7.5 (6–9); 10
Head and body	64.0 (61–69); 4	67.8 (62–74); 3	65.0 (60–70); 3	65.4 (60–74); 10
Tail	35.7 (33–38); 3	38.9 (37–41.7); 3	43.7 (42–45); 3	39.4 (33–45); 9
Hindfoot	12.6 (12–13); 4	13.3 (13–14); 3	13.7 (13–14); 3	13.1 (12–14); 10
Ear	7.7 (7.5–8); 4	10.3 (9.6–11); 3	8.5 (8.5, 8.5); 2	8.7 (7.5–11); 9

Table 3. Cranial measurements of different populations of *Crocidura*. Mean, range and sample size indicated. U = upper unicuspid teeth.

	Alegranza N = 1	Montaña Clara	Graciosa N = 1	Lanzarote	Fuerteventura
Condylo–incisive-length	—	19.67 (19.4–19.9); 4	—	19.26 (18.4–19.8); 5	19.45 (18.6–20.3); 2
I^1–M^3	—	8.40 (8.1–8.7); 4	8.2	8.11 (7.7–8.8); 35	8.65 (8.2–9.1); 2
U^1–U^3	2.5	2.67 (2.5–2.8); 4	—	2.65 (2.4–2.9); 22	2.80 (2.7–2.9); 2
M^2–M^2 (external)	—	5.77 (5.6–5.9); 3	5.3	5.37 (5.0–5.8); 34	5.65 (5.6–5.7); 2
U^1–U^1 (external)	—	2.55 (2.4–2.6); 4	—	2.30 (2.1–2.5); 20	2.50 (2.4–2.6); 2
Height of rostrum at U^3	—	1.87 (1.8–2.0); 3	1.6	1.71 (1.6–1.8); 35	1.75 (1.7–1.8); 2
Height of coronoid process	4.9	5.20 (5.1–5.3); 4	4.8	4.65 (4.2–5.1); 67	5.00 (4.7–5.3); 2

	Canary Islands all data	Morocco (Vesmanis & Vesmanis, 1980	Algeria, data from BM(NH) material
Condylo–incisive-length	19.44 (18.4–20.3); 11	19.04 (18.1–19.8); 22	19.78 (19.2–20.3); 10
I^1–M^3	8.16 (7.7–9.1); 42	8.25 (7.7–8.6); 21	8.72 (8.5–9.0); 10
U^1–U^3	2.67 (2.4–2.9); 29	—	2.66 (2.6–2.8); 9
M^2–M^2 (external)	5.41 (5.0–5.9); 40	5.66 (5.5–5.9); 23	5.87 (5.6–6.1); 10
U^1–U^1 (external)	2.36 (2.1–2.6); 26	—	2.37 (2.2–2.5); 10
Height of rostrum at U^3	1.72 (1.6–2.0); 41	1.70 (1.4–1.9); 23	1.83 (1.6–2.0); 10
Height of coronoid process	4.69 (4.2–5.3); 75	4.56 (4.4–4.8); 23	4.75 (4.5–5.1); 10

taña Clara. There is also a marked individual variation in skull size. Of two shrews found in the same habitat at La Oliva, Fuerteventura, one has a small skull (CIL 18.6 mm) with a weak dentition, and the other one a large skull (CIL 20.3 mm) with heavy teeth and a canine-like U^1 (Figure 2). Both shrews are of similar age. Unfortunately the sexes have not been recorded by the collector, but judged from the skins the two shrews are female and male. It is most likely that the observed differences as well as the wide range of measurements (Table 3) reflect a sexual dimorphism. A sexual dimorphism is not present in the populations of middle Europe but has been recently recorded from a small island (Meda Grossa) off the mediterranean coast of Spain (Sans-Coma, Gomez & Gosalbez 1976). Females are significantly smaller on this island. A sexual dimorphism is also likely to occur in the Moroccan populations of *Crocidura russula yebalensis*. The range of measurements observed (Vesmanis & Vesmanis 1980; Hutterer, unpublished data) is very similar to that of the Canary shrews. We therefore conclude that the Canary shrews are likely to stem from northern African populations.

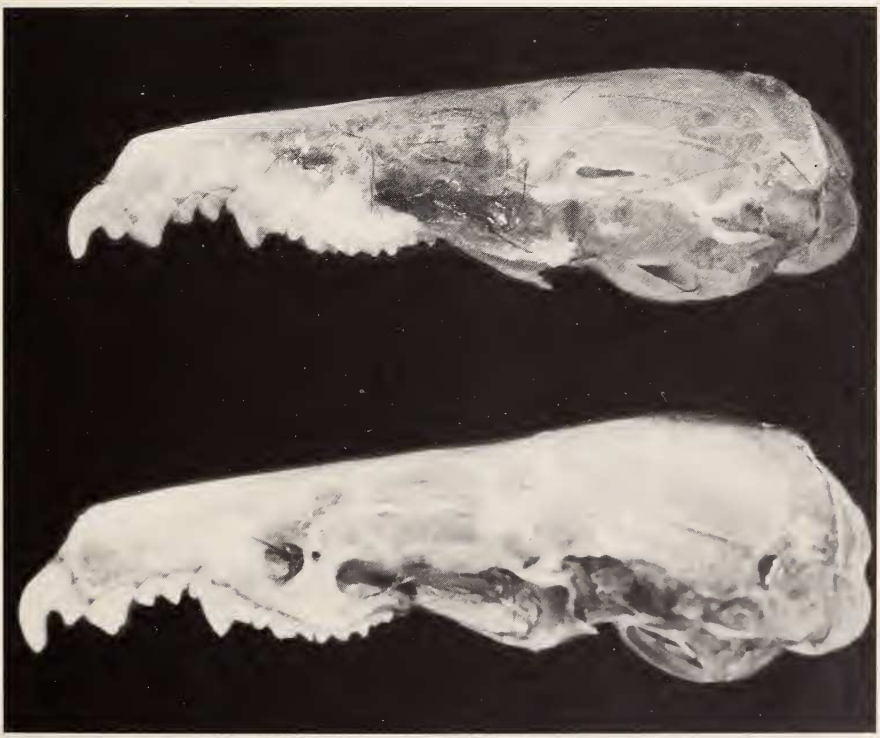

Fig. 2. Two skulls of *Crocidura* from La Oliva, Fuerteventura illustrate the enormous size variation of the Canary population which is probably due to sexual dimorphism.

A major problem is the karyotype of the Canary shrews. López-Jurado and Ruiz (unpublished data) have prepared chromosome slides from a *Crocidura* caught on Fuerteventura, and these gentlemen have kindly placed a photograph of a metaphase at our disposal. Our analysis yields a complement of 2 N = 38 chromosomes, with NF = 54. Six pairs of chromosomes can be classified as submetacentrics, two pairs as subtelocentrics and the remaining eleven pairs as acrocentrics. If this preliminary result is supported by further analysis of additional karyotypes, then the Canary shrew must be regarded as genetically different from the European species, with 2 N = 42 and NF = 60 (Catzeflis 1983). However no chromosome data is available from North African populations and it would be necessary to re-study the many forms recently described from Morocco by Vesmanis & Vesmanis (1980). At this moment we regard the Canary *Crocidura* as conspecific with the Moroccan form *russula yebalensis* for the reasons given above.

Discussion

We have reasons to believe that shrews are not a recent introduction to the Canary Islands but have lived there for quite a long time. The Naturhistorisches Museum Wien has a specimen (NMW 9100) labeled 'Kanarische Inseln' which was collected between 1885 and 1887 by Vojtech Frič, a Czechoslovakian who travelled several times to South America (Bauer, in litt. 1984). The specimen is a juvenile female preserved in spirit with the skull extracted. Although its skull is very young, the teeth agree well with the *Crocidura* recently collected in the Canary Islands. The old specimen has very pale extremities similar to the Lanzarote shrews.

Martín observed that the older people of Lanzarote of an age of about seventy years always remember the existence of 'ratones de hocido largo' as they invariably name the shrews. A further reason for the long existence of shrews is that a nest of *Tyto alba gracilirostris* found on Lanzarote contained bones of *Crocidura* down to a depth of 5 cm.

Biometrical data and cranial characters support our view that the colonists came once from the NW coast of Africa. However, the observed differences in colour and size between populations of different islands indicate also that genetic changes have occurred. Probably chromosomal changes have also occurred but our present information is too scanty to draw final conclusions. We cannot find constant morphological characters that would separate the Canary shrews from mainland forms of *Crocidura russula.*

Sexual dimorphism in size is probably present in the Canary shrew. Its adaptive significance is still unknown but the phenomenon itself is frequent among subtropical and tropical shrews of Africa.

Populations like that on Montaña Clara seem to be well adapted to the special conditions of this small island. Presumably they are even more successful than mice which apparently do not live on this island. At least partial competition between shrews and mice on the small islands is indicated by our data.

The main distribution of *Crocidura* on the eastern islands Lanzarote (plus the islets) and Fuerteventura might be interpreted as a support of the landbridge theory developed by Rothe (1974) and based mainly on the finding of fossil ratite eggshells (*Aepyornis* and *Struthio*). These fossils date from the Late Tertiary. However, *Crocidura* is a young genus with fossil records only from the Pleistocene. Therefore a later colonisation from the continent of Africa sometime since the Pleistocene seems more likely. The striking colour differences between the populations of Fuerteventura and Lanzarote might be the result of different colonisations, or simply an effect of genetic drift.

Acknowledgements

We are grateful to Mr. L. López-Jurado and G. Delgado who provided us with information and specimens collected by them, and also to Mr. E. Hernández and M. Ascanio who helped us to trap in some of the localities. Dr. K. Bauer informed us about the historical record in the Vienna museum, and Dr. H. Schifter sent a copy of Floericke (1903). To all we express our sincere thanks.

Summary

Two species of Soricidae are recorded from the Canary Islands. *Suncus etruscus* was found on Tenerife and *Crocidura russula* on Fuerteventura, Lobos, Lanzarote, Graciosa, Montaña Clara, Alegranza, and Tenerife. Shrews probably also occur on Gran Canaria. An old museum record of that species dates from 1887. The taxonomy of the Canary *Crocidura* is discussed in detail. Notes are given on coloration, size variation, sexual dimorphism and the karyotype. It is concluded that the Canary *Crocidura* is likely to stem from North African populations of *Crocidura russula yebalensis*.

Zusammenfassung

Zwei Spitzmausarten werden erstmals von den Kanarischen Inseln gemeldet. *Suncus etruscus* wurde auf Teneriffa gefangen und *Crocidura russula* auf Fuerteventura, Lobos, Lanzarote, Graciosa, Montaña Clara, Alegranza und Teneriffa. Spitzmäuse kommen vermutlich auch auf Gran Canaria vor. Ein historischer Beleg von den Kanarischen Inseln im Naturhistorischen Museum Wien datiert von 1887. Die Taxonomie der kanarischen *Crocidura* wird diskutiert, und es werden Angaben über Färbung, Größenvariation, Geschlechtsdimorphismus und Karyotyp gemacht. Aus den vorliegenden Daten wird gefolgert, daß die kanarischen *Crocidura* wahrscheinlich von nordafrikanischen Populationen der *Crocidura russula yebalensis* abstammen.

Literature cited

Catzeflis, F. (1983): Relations génétiques entre trois espèces du genre *Crocidura* (Soricidae, Mammalia) en Europe. — Mammalia 47: 229—236.
Floericke, C. (1903): Aus der Heimat des Kanarienvogels. — Mitt. österr. Reichsb. Vogelkde Vogelschutz Wien, 3: 41—44, 56—58, 63—66.
Gebhardt, L. (1964): Die Ornithologen Mitteleuropas. — Brühl, Gießen, 404 pp.
Herter, K. (1972): Der Igel von Gran Canaria. — Zool. Beitr., N.F., 18: 311—313.
— (1974): Der Igel von Fuerteventura. — Zool. Beitr., N.F., 20: 147—150.
Hutterer, R. (1979): Occurrence of the European free-tailed bat *Tadarida teniotis* on Hierro, Canary Islands. — Afr. Small Mammal Newsl. 3: 6—7.
— (1983): Über den Igel (*Erinaceus algirus*) der Kanarischen Inseln. — Z. Säugetierkunde 48: 257—265.
Kunkel, G. (1971): La vegetación de la Graciosa y notas sobre Alegranza, Montaña Clara y el Roque del Infierno. — Monogr. biol. canar. 2: 4—67.
Niethammer, J. (1972): Der Igel von Teneriffa. — Zool. Beitr., N.F., 18: 307—309.
Rothe, P. (1974): Canary Islands — origin and evolution. — Naturwissenschaften 61: 526—533.
Sans-Coma, V., I. Gomez & J. Gosalbez (1976): Eine Untersuchung an der Hausspitzmaus (*Crocidura russula*) auf der Insel Meda Grossa (Katalonien, Spanien). — Säugetierkdl. Mitt. 24: 279—288.
Schwabe, H.N. (1979): Die Igel von Gran Canaria. — Z. Säugetierkunde 44: 132—134.
Vesmanis, I.E., V. Sans-Coma & R. Fons (1980): Die Etruskerspitzmaus, *Suncus etruscus* (Savi, 1822) in Tunesien (Mammalia: Insectivora). — Afr. Small Mammal Newsl., s.n. 3: 1—46.
— & A. Vesmanis (1980): Beitrag zur Kenntnis der Crociduren-Fauna Marokkos . . . — Zool. Abh. st. Mus. Tierk. Dresden 36: 11—80.

Addresses of the authors: Aurelio Martín, Departamento de Zoologia, Universidad de La Laguna, Tenerife, Islas Canarias; Rainer Hutterer, Zoologisches Forschungsinstitut und Museum Alexander Koenig, Adenauerallee 150—164, 5300 Bonn 1; Gordon B. Corbet, British Museum (Natural History), Cromwell Road, London, England.